

LouisSaveinDupuisJournalofMultidisciplinaryResearch2024,3  
: 226-229Doi.: 10.21839/lsdjmr.2024.v3.164

## Research Article

# Gsm Based Security System in Museums

P. Rajamani

Assistant Professor of physics,  
Immaculate College for Women,

(Corresponding author: rmani499gmail.com)

S. Thenmalar

IIIrd year B.sc physics,  
Immaculate College for Women,

## Abstract

Improved technology is being used by researchers worldwide to discover a remedy for robbery and trespassing. The design and implementation of a laser-based smart security system for identifying such activity is the subject of our paper. With the use of passive infrared (PIR) and laser sensors, it seeks to safeguard residences and museums against harm, danger, and criminal activities. Two sensors, such as a PIR and LDR sensor, an Arduino Uno microcontroller, and a GSM (Global System for Mobile Communication) module make up this security system. The technology is designed such that the circuit detects the cut-off and stumbles the alarm when someone interrupts the laser beam or PIR sensor. When someone examines it and manually turns it off, the frightening noise continues.

When the beam is broken, the system uses the GSM network to give the user a warning call. Data is supplied to close the shutter and safeguard our goods when the system is activated. It is among the most cost-effective security devices available for safeguarding our possessions. This system requires extremely little electricity and is very capable.

**Keywords:** *Actinidia chinensis*; *Actinidia deliciosa*; *Pseudomonas syringae* pv. *Actinidiae*; quality

## Introduction

Security is the ability to withstand or be protected from possible danger. The main definition of security is defense against adversaries. Any important asset, whether a person, home, town, country, or organization, is covered by this. Automated security systems have emerged as one of the world's fastest-growing application-based technologies in the era of digital technology and intelligent systems. Homes, schools, hospitals, prisons, workplaces, airports, temples, museums, and more have all made extensive use of security systems. In this project, our primary goal was to use laser technology to strengthen the museum's security system. One of the crucial roles that museums play is museum security. Millions of valuable Approximately 1,000 museums nationwide hold historical objects that may hold unparalleled relevance for our natural and cultural heritage. The amount of thefts that occur in museums worldwide has rapidly increased in recent years. For example, it was estimated that around 18,000 pieces of art were stolen in the United States alone in 1978. The scenario can be far more concerning in India. Therefore, the adoption of advanced security systems using contemporary technologies and approaches is urgently needed. Security in museums is a complex matter that must be addressed from the beginning of the building's design.

In actuality, security encompasses more than just protection from theft and vandalism; terrorist attack.

In order to protect priceless artifacts, guarantee visitor safety, and maintain the cultural legacy kept within the museum, the security system for museums integrates physical security measures, electronic surveillance, access control, and environmental monitoring. Despite the availability of numerous technologies and methods for museum security, the majority of museums do not implement all security measures simultaneously to provide complete museum security. As a result, a GSM-based integrated security system can be implemented through all accessible means, including contemporary devices, allowing for a multiple security system for complete museum protection.

The GSM-based security system is intended to identify any illegal entry or incursion into a space and notify the verified user via phone calls and SMS. Once started, this system is completely automatic. Without adding to the workload of those responsible for security, this technology adds security. The laser fencing serves as a barrier in an integrated two-level security system. The secondary security system is activated

when the alarm system is disrupted. The system makes use of many electronic components and a microcontroller to do this.

### **Objectives of the study**

This project aims to further our understanding of GSM-based security technology, which will ultimately lead to the development of more reliable, effective, and efficient security systems for protecting assets and properties.

### **System Components**

#### ***Arduino uno Microcontroller***

The Arduino UNO microcontroller board is built on top of the ATmega328P. It has 14 digital input/output ports, 6 of which can be used as PWM outputs, 6 analog inputs, and a quartz crystal operating at 16 MHz

#### ***GSM module***

At 850, 900, 1800, and 1900 MHz, it uses a SIM800 board that supports quad-band frequencies. It features a SIM card holder, a GSM antenna, and an RS232 serial interface.

#### ***Sensors***

A sensor is an object that senses events or changes in its environment and responds by producing an output. Two sensors are used in this proposed system. These sensors are LDR and PIR.

A sensor that responds to light by decreasing its resistance is known as a light-dependent resistor (LDR) sensor. This type of sensor is commonly used in light sensor circuits in various locations. Gallium arsenide, germanium, silicon, cadmium sulfide, and lead sulfide are the semiconductors most frequently utilized in this system. The operating voltage range for the LDR is 3.3 to 5 volts. Among the many applications for LDR are lighting switches, shutter control for cameras, and transistor circuits that are controlled by LDR. To get the desired results, Arduino boards can be interfaced with LDR receivers.

Infrared (IR) light released by objects in their field of vision, such as people, animals, or anything else, is detected by PIR sensors, which are electronic devices that use motion detectors. Any energy that an object emits above absolute zero is called radiation. Although electrical gadgets may detect it, infrared radiation is mainly undetectable to the human eye.

***NodeMcu and wifi module*** An open-source development kit and create prototypes of Internet

of Things devices. It has firmware that runs on the ESP8266 Wi-Fi SoC from Expressive Systems and hardware based on the ESP-12 module.

#### ***Buzzer***

An electro-acoustic transducer, like a buzzer, produces sound when an electrical signal is supplied to it. The buzzer creates audible tones at a specific frequency by rapidly oscillating its internal component, which results in sound waves.

#### ***Light and laser module***

A laser module is a compact electrical device that contains a laser diode, optics, and power supply components. The laser diode emits light through a process called stimulated emission when an electrical current is supplied to it.

#### ***Light Emitting Diodes (LEDs)***

These light sources are semiconductors that mix a P-type semiconductor (which has a greater hole concentration) and an N-type semiconductor (which has a higher electron concentration). When a sufficiently high forward voltage is given, the electrons and holes will recombine at the P-N junction, releasing energy in the form of light.

#### ***Stepper motor***

Stepper motors are electric motors that convert digital pulses into mechanical motion. Unlike DC motors, which rotate continuously when power is applied, stepper motors move in discrete steps, making them ideal for applications requiring precise positioning and control. A complete 360° rotation involves multiple steps. Intelligent rotation control is made possible by the future of stepper motors.

#### ***Power source***

A power source is an apparatus, system, or component that generates, stores, or disperses electrical energy to power electronic devices, systems, or equipment. It converts one form of energy into electrical energy, which can then be used for a number of things, including as generating electricity or carrying out tasks.

#### ***A regulator of dc voltage***

The An 8–20 volt DC power supply can be connected to the Arduino Uno through its coaxial power connector thanks to the circuit board's 5-volt linear voltage regulator. The regulator lowers this to the 5-volt DC level that the Arduino needs.

#### ***Methodology and system operation***

Light is produced by the laser module.

The LDR detects a drop in light intensity when this light beam breaks. The PIR and LDR provide the analog value that the Arduino reads. The buzzer is set to sound the warning if the reading drops below a predetermined threshold, which indicates that the laser beam has been interfered with. The input and output of the system, as well as its procedures and capabilities, are listed below:

### ***The laser-pir barrier***

A square or rectangular laser fencing barrier is created when the laser beam is projected and reflected by the mirrors on each of the four corners. The laser fencing keeps the things that need to be safeguarded within. Additionally, the PIR sensor is positioned in the corners.

### ***The Smart Shutter***

The servo motor is instructed by the NodeMCU after it has received the signal from the first system's microcontroller. To ensure safety, the servo motor rotates to close the shutter or protective door.

## **Design requirement**

### ***Software Specification***

We programmed the Arduino UNO microcontroller for software design using the C and C++ programming languages and the Arduino IDE libraries. Sketching is a common term used to describe the code or program written in the Arduino IDE.

## **Results and discussions**

This chapter will cover both the outcomes of using GSM in the security system and the outcomes of not employing it.

### ***Compare and contrast***

This section will discuss the existing museum security system and compare it to the GSM-based system.

### ***Future Implementation/ Suggestions***

To increase security, the proposed GSM-based security system can be expanded with more sensors and parts. The installation of magnetic contacts will alert the user if the display is disturbed or if the valuables are touched.

## **Advantages of Gsm Based Security System**

Accurate detection: Motion sensors and laser detection enable precise detection, which helps to create virtual perimeters around our assets.

Low maintenance: It requires less maintenance than physical barriers or manned security stations.

A laser system is used to generate a virtual security screen or carpet that allows an object to be accurately identified within a designated region. The LASER technology creates a very safe space.

## **Disadvantages of Gsm Based Security System**

The laser security system only works when the laser is obstructed. If the intruder gets through without obstructing the laser, it is considered a failure.

The data transfer rate provided by GSM is a little bit constrained.

These security systems have a tendency to set off false alarms, which occur when a member of your family enters a restricted area.

## **Applications**

A laser security system can be installed in our homes' safety lockers, providing an extra degree of protection even in the event that the code is cracked.

In addition to security systems, this laser-based technology can be used to determine whether infants or dogs have crossed a particular line.

PIR-enabled security systems are frequently utilized in automated lighting applications. Automatic street lighting systems also use LDR sensors. The automatic parking system greatly benefits from laser sensors.

## **Reference**

Ripan Kumar Ray,

Muhammad Afsar Uddin and Syed Foy sol Islam 2016 "GSM Based Bank Vault Security System" International Journal of Computer Science and Information Security (IJCSIS), Vol. 14.

Vincent Lusterio,

Robert Christian Montecer, Dr. Neil Balba 2020 on "Multiple Laser Alarm System using Arduino Uno" in LPU-Laguna Journal of Engineering and Computer Studies, Vol. 4 No. 3.

H.R. Hatem,

J.N. Shehab and I. Abdul-Rahman 2017, "ARDUINO Microcontroller Based Building Security System," Engineering and Technology Journal, Vol. 35, Part A, No. 5, pp. 532-536.

Taseen Muhtadi,

Nurul Amin, Musrat Tabassum 2012, "Museum Security System".

Vipul Goel,

Rishabh Varshney, Saksham Parashar, Sahil Ali, Pravesh Singh 2022, Laser Based Smart Security Apparatus Using Arduino, International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 10 Issue III - Available at [www.ijraset.com](http://www.ijraset.com).

Monish Paraste,

Om Katre, Krishnapal Lodhi, Navneet Ahirwar, Pradeep Ahirwar, Hirendra Kaushal 2023, "LASER SECURITY SYSTEM", International Research Journal of Modernization in Engineering Technology and Science, Volume:05/Issue:09/.

Ayub Mohammad,

Dr. K. Kalyani Radha 2017, "An IOT based Solar Integrated Home Security System by using GSM Module and Raspberry pi", International Journal of Advanced Engineering Research and Science (IJAERS) [Vol-4, Issue-12,] ISSN: 2349-6495(P) | 2456-1908(O).

Mohammed, Ayad. (2015).

Design and Construction of a Smart Security System by Laser Fence Technique, FOND.

Open Journal of Safety

Science and Technology (journalarticles.aspx? journalid=600) > Vol.5 No.2, June 2015 (home.aspx? issueid=6465#57161).

Dr. Abduraheem K. and

Dr. Sheeba Khan, "Integrated Museum Security Systems", Aligarh.

"Security Measures in

ShreeSwaminarayanMuseum,Ahmedabad" by Dr. Indubala Nahakpam, Ahmedabad.

Mohd. Saifuzzaman,

Ashraf Hossain Khan, Nazmun Nessa Moon, Fernaz Narin Nur 2017, "Smart Security for an Organization based on IoT", International Journal of Computer Applications Volume 165 – No.10.

Huiping Huang,

Shide Xiao, Xiangyin Meng, Ying Xiong 2010, "A Remote Home Security System Based on Wireless Sensor Network and GSM Technology", Second International Conference on Networks Security, Wireless Communications and Trusted Computing.

D. Mohan and Gopakumar 2013

"Multi Security System" International Journal of Engineering Science Invention, Volume 2, Issue 10, 23-29, 2.

D.F. Da Silva and D. Acosta-Avalos 2006

"Light Dependent Resistance as a Sensor in Spectroscopy Setups Using Pulsed Light and Compared with Electret Microphones" Sensors, 6, 514-525.

"Arduino UNO", Arduino 2016.

cc/en. Retrieved.

[https://www.electronicsforu.com/electronics-](https://www.electronicsforu.com/electronics-projects/prototypes/laser-light-security-alarm)

projects/prototypes/laser-light-security-alarm

"Arduino UNO",

Arduin 2016 o. cc/en. Retrieved .

"SIM900 GPRS/GSM Shield",

linksprite.com. Retrieved 2016.

[https://www.electroduino.com/sim800l-](https://www.electroduino.com/sim800l-gsm-module/#:~:text=SIM800L%20support%20Quad%20band%20frequency,by%20a%20LiPo%20battery%20supply.)

gsmmodule/#:~:text=SIM800L%20support%20Quad%20band%20frequency,by%20a%20LiPo%20battery%20supply.

[https://medium.com/](https://medium.com/@shambadityamukherjee/control-a-stepper-motor-using-arduino-298141e247ea)

@shambadityamukherjee/control-a-stepper-motor-using-arduino-298141e247ea